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Test 1153: International 4366 Turbo Diesel

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NEBRASKA TRACTOR TEST 1153 – INTERNATIONAL 4366 TURBO DIESEL

DRAWBAR PERFORMANCE

| Hp | Draw- bar pull lbs | Speed miles per hr | Crank- shaft speed rpm | Slip of drivers % | Fuel Consumption Gal per hr | Lb per hp-hr | Hp-hr per gal | Temp Cool- ing med | Degrees F Air wet bulb | Air dry bulb | Barometer inches of Mercury |
|----|-----------------------------|-----------------------------|---------------------------------|-------------------------|--------------------------------------|--------------------|---------------------|-----------------------------|---------------------------------|--------------------|-----------------------------------|
|----|-----------------------------|-----------------------------|---------------------------------|-------------------------|--------------------------------------|--------------------|---------------------|-----------------------------|---------------------------------|--------------------|-----------------------------------|

VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST

| Maximum Available Power—Two Hours—4th Gear (4 Lo) | | | | | | | | | | | |
|---|-------|------|------|------|--------|-------|-------|-----|----|----|--------|
| 163.17 | 11426 | 5.36 | 2600 | 2.90 | 13.008 | 0.552 | 12.54 | 187 | 52 | 62 | 28.660 |
| 75% of Pull at Maximum Power—Ten Hours—4th Gear (4 Lo) | | | | | | | | | | | |
| 134.43 | 8834 | 5.71 | 2748 | 2.11 | 11.219 | 0.577 | 11.98 | 167 | 36 | 39 | 28.540 |
| 50% of Pull at Maximum Power—Two Hours—4th Gear (4 Lo) | | | | | | | | | | | |
| 94.35 | 6025 | 5.87 | 2809 | 1.46 | 9.123 | 0.669 | 10.34 | 166 | 41 | 42 | 28.750 |
| 50% of Pull at Reduced Engine Speed—Two Hours—6th Gear (1 Hi) | | | | | | | | | | | |
| 94.63 | 6049 | 5.87 | 1785 | 1.46 | 6.558 | 0.480 | 14.43 | 162 | 44 | 45 | 28.700 |

MAXIMUM POWER WITH BALLAST

| | | | | | | | | | |
|--------|-------|------|------|-------|-----------------|-----|----|----|--------|
| 146.26 | 23138 | 2.37 | 2672 | 14.88 | 1st Gear (1 Lo) | 172 | 37 | 41 | 28.790 |
| 165.02 | 19125 | 3.24 | 2599 | 6.41 | 2nd Gear (2 Lo) | 170 | 36 | 40 | 28.780 |
| 166.68 | 14884 | 4.20 | 2600 | 4.15 | 3rd Gear (3 Lo) | 185 | 51 | 60 | 28.630 |
| 167.55 | 11733 | 5.36 | 2600 | 2.86 | 4th Gear (4 Lo) | 186 | 55 | 67 | 28.620 |
| 168.90 | 9520 | 6.65 | 2598 | 2.16 | 5th Gear (5 Lo) | 185 | 52 | 62 | 28.620 |
| 167.80 | 7387 | 8.52 | 2599 | 1.70 | 6th Gear (1 Hi) | 182 | 51 | 60 | 28.630 |

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST 4th Gear (4 Lo)

| | | | | | | |
|----------------------|--------|--------|--------|--------|--------|-------|
| Pounds Pull | 11733 | 13268 | 14404 | 15082 | 14574 | 13363 |
| Horsepower | 167.55 | 169.36 | 162.38 | 147.90 | 123.99 | 93.87 |
| Crankshaft Speed rpm | 2600 | 2335 | 2071 | 1803 | 1565 | 1286 |
| Miles Per Hour | 5.36 | 4.79 | 4.23 | 3.68 | 3.19 | 2.63 |
| Slip of Drivers % | 2.86 | 3.39 | 3.85 | 4.15 | 3.85 | 3.54 |

TRACTOR SOUND LEVEL (with cab) dB (A)

| | |
|--|------|
| Maximum Available Power 2 Hours | 84.5 |
| 75% of Pull at Max. Power 10 Hours | 86.0 |
| 50% of Pull at Max. Power 2 Hours | 86.0 |
| 50% of Pull at Reduced Engine Speeds 2 Hours | 82.5 |
| Bystander 10th Gear (5 Hi) | 93.0 |

TIRES, BALLAST AND WEIGHT

| | | With Ballast | Without Ballast |
|----------------------------------|----------------------|-------------------|-------------------|
| Rear Tires | —No, size, ply & psi | Four 23.1-30;8;12 | Four 23.1-30;8;12 |
| Ballast | —Liquid | 119 lb each | None |
| | Cast Iron | None | None |
| Front Tires | —No, size, ply & psi | Four 23.1-30;8;12 | Four 23.1-30;8;12 |
| Ballast | —Liquid | 209 lb each | None |
| | Cast Iron | None | None |
| Height of drawbar | | 19 inches | 19½ inches |
| Static weight with operator—rear | | 9190 lb | 8715 lb |
| | front | 13810 lb | 12975 lb |
| | total | 23000 lb | 21690 lb |

Department of Agricultural Engineering

Dates of Test: November 8 to November 29, 1973

Manufacturer: INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILLINOIS

FUEL, OIL AND TIME Fuel No 2 Diesel Cetane No 50.1 (rating from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8310 Weight per gallon 6.919 lb Oil SAE 30 API service classification I.H. No 1 Engine oil SAE 30 recommended or series 3 (CD CC CB CA SE SD SC) (Formerly DS DM DG MS) To motor 4.599 gal Drained from motor 3.709 gal Transmission and final drive lubricant Hy-Tran fluid Total time engine was operated 41 hours.

ENGINE Make International Diesel Type 6 cylinder vertical with turbo-charger Serial No 466TT2U002990* Crankshaft Mounted length-wise Rated rpm 2600 Bore and stroke 4.30" x 5.35" Compression ratio 15.1 to 1 Displacement 466 cu in Cranking system 12 volt electric (two 6 volt batteries) Lubrication pressure Air cleaner two stage dry type with replaceable pleated paper primary and safety elements with automatic dust unloader Oil filter full flow using two replaceable screw-on cartridges Oil Cooler engine coolant heat exchanger for crankcase oil and radiator for transmission oil Fuel filter one primary and one final using replaceable screw-on cartridges Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type 4-wheel drive Serial No 2970001U007612* Tread width rear 96" to 126" front 96" to 126" Wheel base 118" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 70.6" Vertical distance above roadway 46" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio Advertised speeds mph first 2½ second 3¼ third 4¼ fourth 5¼ fifth 6½ sixth 8¼ seventh 10½ eighth 13¼ ninth 16½ tenth 20½ reverse 2¼ and 7½ Clutch double dry disc operated by foot pedal Brakes caliper disc brake on drive line operated hydraulically by foot pedal Steering hydrostatic and articulated Turning radius (on concrete surface without brake) right 241" left 241" Turning space diameter (on concrete surface without brake) right 536" left 536".

REPAIRS and ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure.

Seventh, eighth, ninth and tenth gears were not run as test procedure requires only six travel speeds.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1153.

L. F. LARSEN

Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
H. W. Ottoson, Director and Acting Dean

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, $\frac{1}{2}$ of the 85% torque; maximum power, $\frac{1}{4}$ and $\frac{3}{4}$ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effects of speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 4 different runs as follows: (1) as near to the pull at maximum power as

possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe limit for the test course. The manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Varying Drawbar Pull and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions: (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68503.



INTERNATIONAL 4366 TURBO DIESEL